We claim:

1. A method of optimizing operation of a communications system for receiving and processing an input communication signal to produce an output communication signal, comprising the steps of:

selecting a first noise margin m relating to an external noise level present in the input communication signal;

selecting a second noise margin m_i relating to an internal noise level generated by the communications system;

calculating a virtual noise-to-signal ratio based on an external noise-to-signal ratio NSRe, an internal noise-to-signal ratio NSRi, said first noise margin, and said second noise margin; and

adjusting at least one operating parameter of the communications system to maintain said virtual noise-to-signal ratio at a predetermined margin above a required noise-to-signal ratio.

2. The method of claim 1, wherein said second noise margin is a predetermined function of said first noise margin.

3. The method of claim 1, comprising the further steps of:

determining said external noise level;

determining said internal noise level; and

determining a total noise level based on said estimates of said external noise level and said internal noise level.

4. The method of claim 3, wherein said step of determining said external noise level comprises the steps of:

providing a known periodic signal as the input communication signal;

performing a first noise power measurement with no output communication signal being generated;

performing a second noise power measurement while the communications system generates the output communication signal corresponding to said known periodic input signal;

providing a pseudo-random signal as the input communication signal;

performing a third noise power measurement while the communications system generates the output communication signal corresponding to said pseudo-random input signal;

determining said external noise level by subtracting a known receiver noise floor from said first noise power measurement; and

determining said internal noise level by subtracting the external noise level from said third noise power measurement.

5. The method of claim 1, wherein said virtual noise-to-signal ratio is calculated as a sum of NSRe, and a product of: (i) a ratio of the second noise margin to the first noise margin and (ii) NSRi.

6. The method of claim 1, wherein said predetermined margin above a required noise-to-signal ratio is equal to said first noise margin m.

7. The method of claim 1, wherein said first noise margin is always greater than or equal to said second noise margin

8. The method of claim 1 comprising the further steps of:

selecting a target margin corresponding to said first noise margin at an initial time; and

selecting a target internal margin corresponding to said second noise margin at said initial time,

wherein said target internal margin is a predetermined function of said target margin.

9. The method of claim 1, wherein said first noise margin and said second noise margin are selected such that said first noise margin remains stable in the presence of one or more measurement errors.

10. The method of claim 1, wherein the communications system is a multiple carrier communications system having a plurality of carrier channels.

11. The method of claim 10, comprising the further steps of:

selecting said first and second noise margins for each said carrier channel; and

adaptively equalizing said first and second noise margins across all of said carrier channels via real time adjustment of said at least one operating parameter.

12. The method of claim 10, wherein said second noise margin is a function of a mean first noise margin for the plurality of carrier channels.

13. The method of claim 1, wherein said second noise margin varies based on the value of m in dB according to:

m_{dB} for $m_{dB} \leq 1.5$,

$\frac{2-1.5}{mt\arg et, dB - 1.5} \left(mdB - 1.5\right) + 0.5$ for $1.5 < m_{dB} \leq m_{target,dB}$, and

$m_{dB} - m_{target,dB} + 2$ for $m > m_{target,dB}$.

14. An optimizing apparatus for a communications system that receives and processing an input communication signal to produce an output communication signal, comprising:

means for setting a first noise margin m relating to an external noise level present in the input communication signal;

means for setting a second noise margin m_i relating to an internal noise level generated by the communications system;

means for calculating a virtual noise-to-signal ratio based on an external noise-to-signal ratio NSRe, an internal noise-to-signal ratio NSRi, said first noise margin, and said second noise margin; and

means for adjusting at least one operating parameter of the communications system to maintain said virtual noise-to-signal ratio at a predetermined margin above a required noise-to-signal ratio.

15. The apparatus of claim 14, wherein said means for setting said second noise margin establishes said second noise margin as a predetermined function of said first noise margin.

16. The apparatus of claim 14, further comprising:

means for determining said external noise level;

means for determining said internal noise level; and

means for determining a total noise level based on said estimates of said external noise level and said internal noise level.

17. The apparatus of claim 16, wherein said means for determining said external noise level comprises:

means for providing a known periodic signal as the input communication signal;

means for performing a first noise power measurement with no output communication signal being generated;

means for performing a second noise power measurement while the communications system generates the output communication signal corresponding to said known periodic input signal;

means for providing a pseudo-random signal as the input communication signal;

means for performing a third noise power measurement while the communications system generates the output communication signal corresponding to said pseudo-random input signal;

means for determining said external noise level by subtracting a known receiver noise floor from said first noise power measurement; and

means for determining said internal noise level by subtracting the external noise level from said third noise power measurement.

18. The apparatus of claim 14, wherein said means for calculating said virtual noise-to-signal ratio calculates said virtual noise-to-signal ratio as a sum of NSRe, and a product of: (i) a ratio of the second noise margin to the first noise margin and (ii) NSRi.

19. The apparatus of claim 14, wherein said predetermined margin above a required noise-to-signal ratio is equal to said first noise margin m.

20. The apparatus of claim 14, wherein said first noise margin is always greater than or equal to said second noise margin

21. The apparatus of claim 14, further comprising:

means for selecting a target margin corresponding to said first noise margin at an initial time; and

means for selecting a target internal margin corresponding to said second noise margin at said initial time,

wherein said target internal margin is a predetermined function of said target margin.

22. The apparatus of claim 14, wherein said first noise margin and said second noise margin are set such that said first noise margin remains stable in the presence of one or more measurement errors.

23. The apparatus of claim 14, wherein the communications system is a multiple carrier communications system having a plurality of carrier channels.

24. The apparatus of claim 23, further comprising:

means for selecting said first and second noise margins for each said carrier channel; and

means for adaptively equalizing said first and second noise margins across all of said carrier channels via real time adjustment of said at least one operating parameter.

25. The apparatus of claim 23 wherein said second noise margin is a function of a mean first noise margin of the plurality of carrier channels.

26. The apparatus of claim 14 wherein said means for setting a second noise margin varies said second noise margin based on the value of m in dB according to:

m_{dB} for $m_{dB} \leq 1.5$,

$$\frac{2-1.5}{mt\arg et,dB-1.5}(mdB-1.5)+0.5 \quad \text{for } 1.5 < m_{dB} \leq m_{target,dB}, \text{ and}$$

$m_{dB} - m_{target,dB} + 2$ for $m > m_{target,dB}$.